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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2019/2020

ECT1016 – CIRCUIT THEORY
(TE, RE)

19 OCTOBER 2019
2:30 p.m. - 4:30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENT:

1. This booklet consists of 7 pages including cover pages with 4 questions only.
2. Attempt **ALL** questions given. All questions carry equal marks and distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.
4. All necessary working **MUST** be shown.

Question 1

- (a) For the circuit in Figure Q1(a), applying KCL to find the branch currents I_1 to I_4 .
[8 marks]

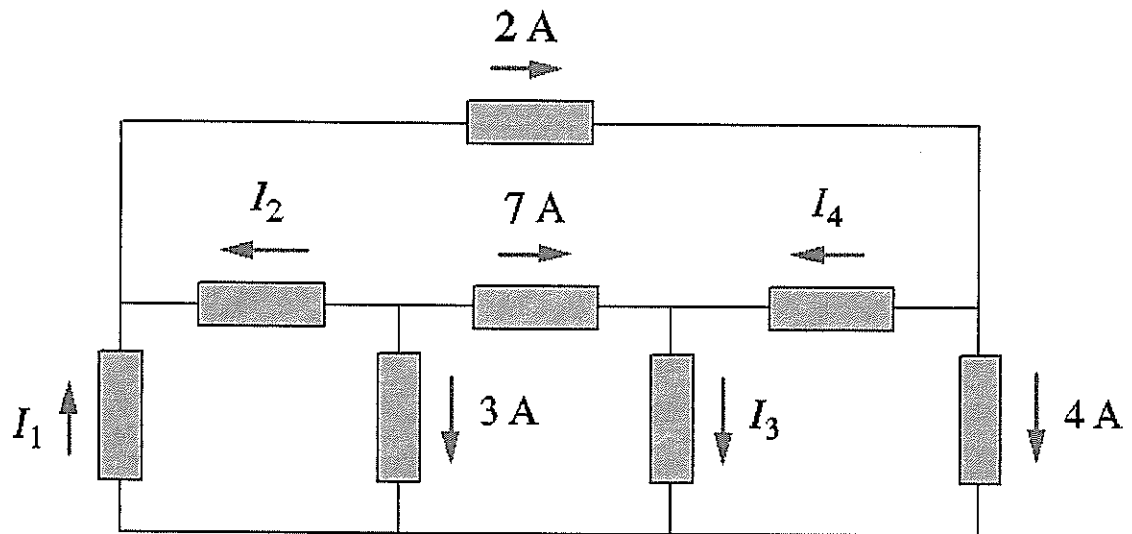


Figure Q1(a)

- (b) By applying KVL to find the branch voltages V_1 to V_4 for the circuit shown in Figure Q1(b).

[8 marks]

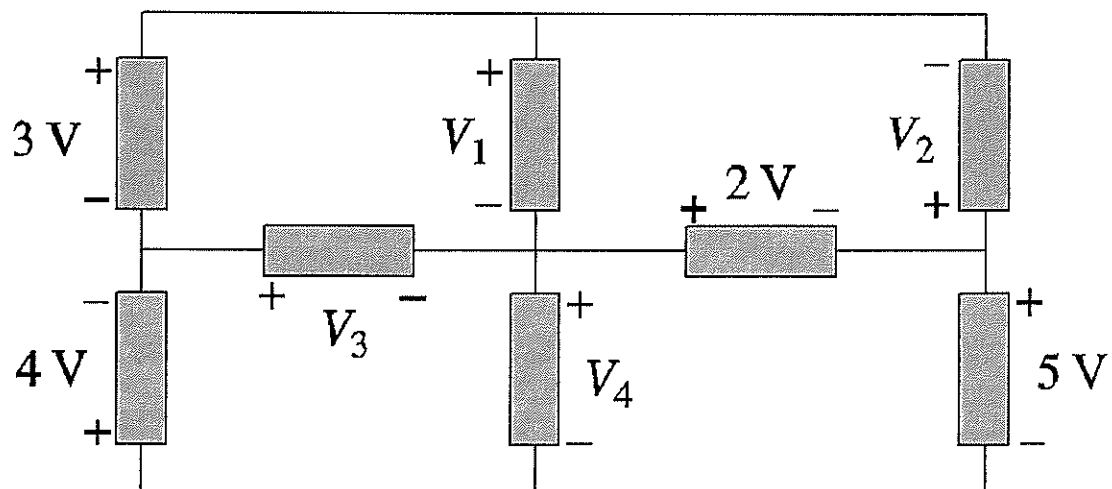


Figure Q1(b)

Continued ...

- (c) Find the current (I) and equivalent Resistance (R_{eq}) in Figure Q1(c).

[6 marks]

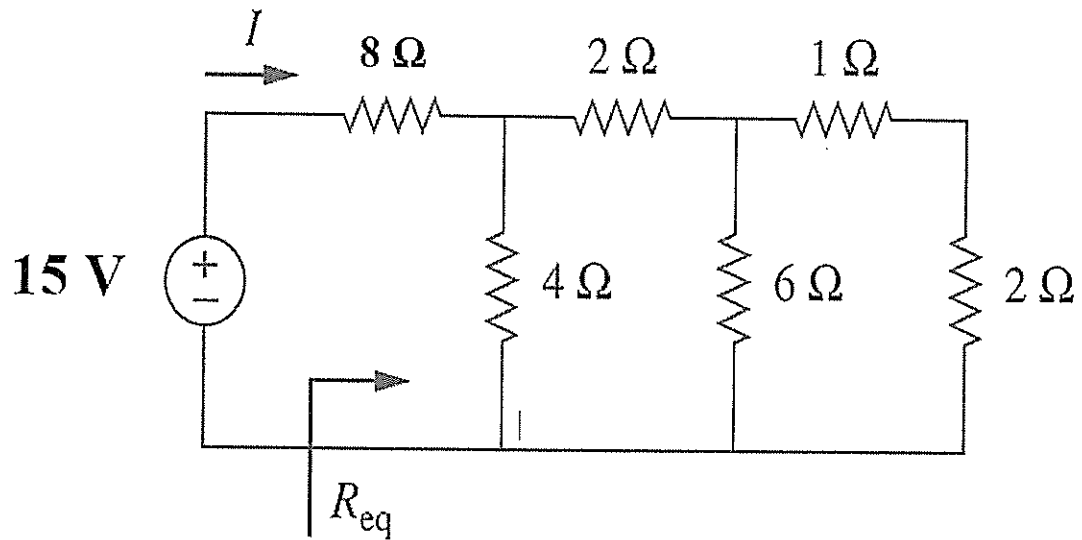


Figure Q1(c)

- (d) Convert the circuit in Figure Q1(d) from Y to Δ .

[3 marks]

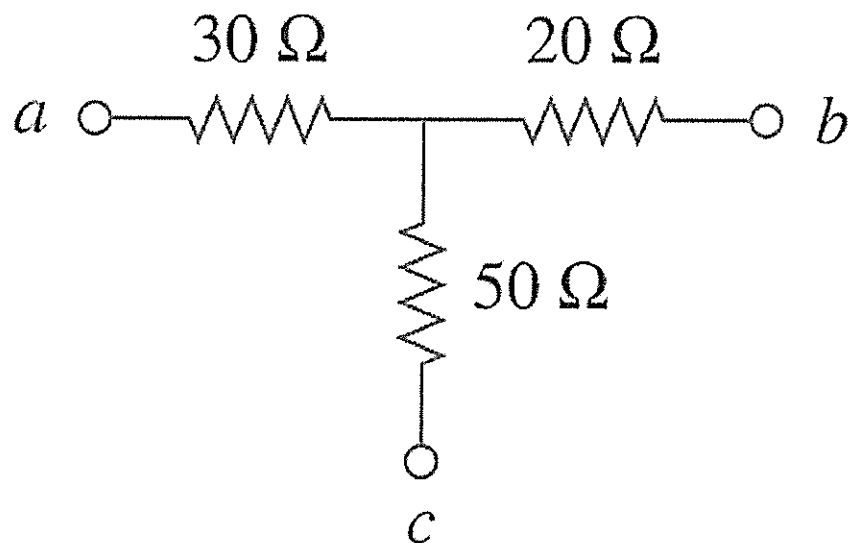


Figure Q1(d)

Continued ...

Question 2

- (a) By applying nodal analysis, find v_o in the circuit in Figure Q2 (a).

[8 marks]

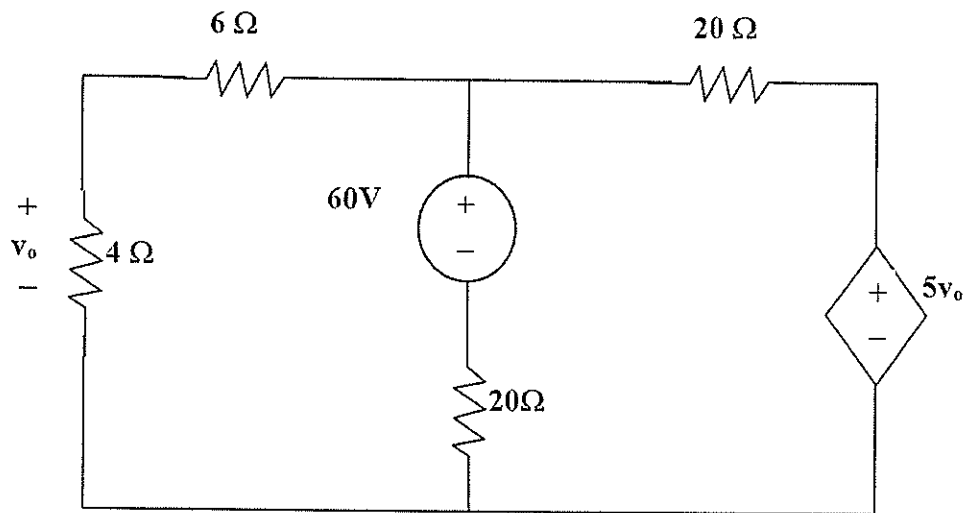


Figure Q2 (a)

- (b) Apply mesh analysis to find v_o in the circuit in Figure Q2 (b)

[8 marks]

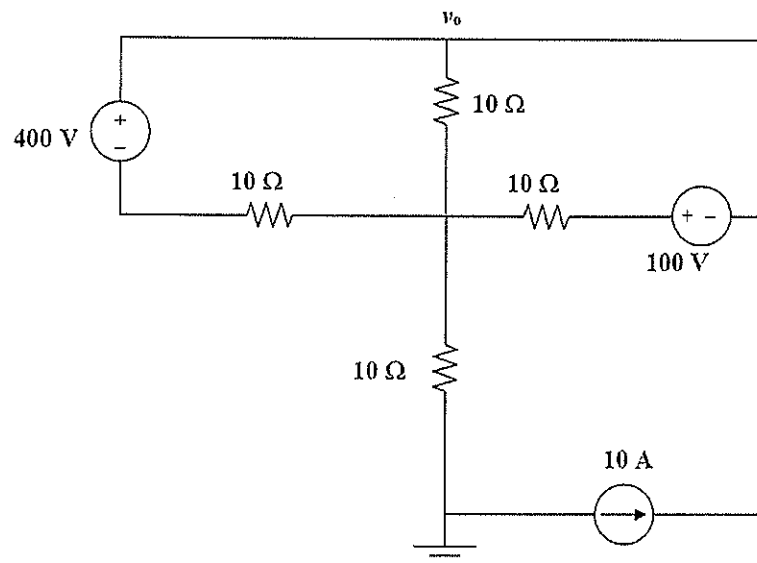


Figure Q2 (b)

Continued ...

- (c) Find the Thevenin equivalent (R_{Th} , V_{Th}) at terminals a-b of the circuit shown in Figure Q2 (c)

[9 marks]

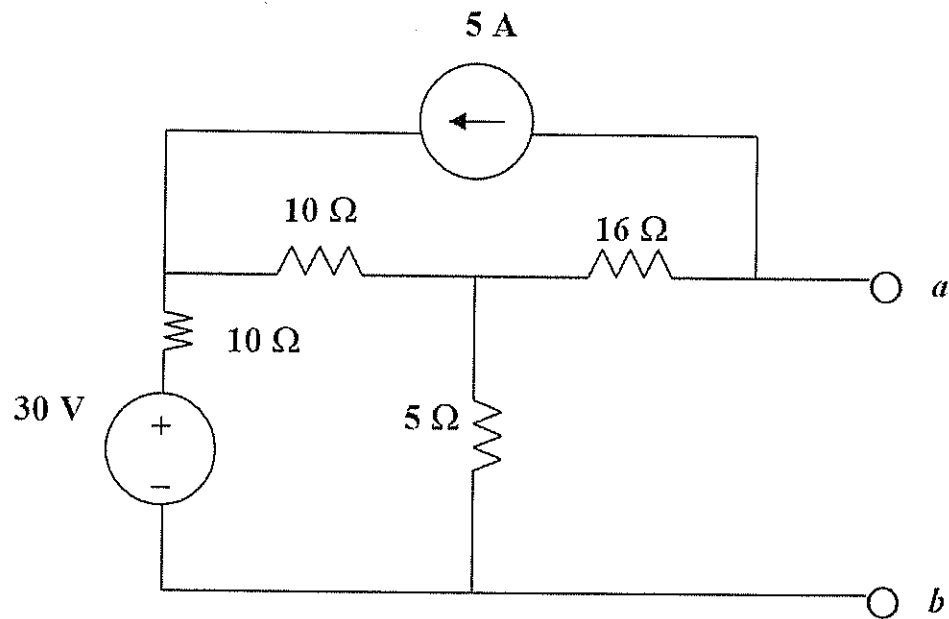


Figure Q2 (c)

Continued ...

Question 3

Consider a RLC circuit as shown in Figure Q3. The impedances of the various components are provided. Determine the:

- (a) load impedance in phasor form, [5 marks]
- (b) phasor current I_s and load voltage V_L , [9 marks]
- (c) apparent power, active power and reactive power consumed by the load, and [9 marks]
- (d) power factor of the load and determine whether it is leading or lagging. [2 marks]

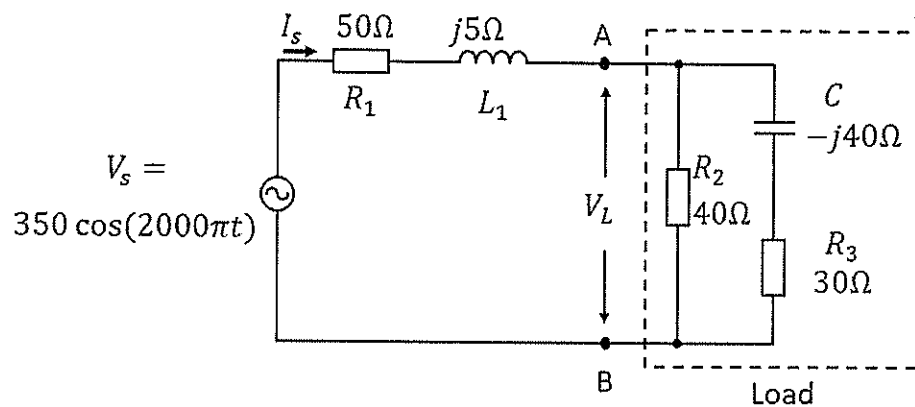


Figure Q3

Continued ...

Question 4

- (a) The switch in the circuit that is shown in Figure Q4(a) is closed at time $t = 0$. Find the expression of the voltage across capacitor for $t > 0$. [11 marks]
- (b) The switch in the circuit shown in Figure Q4(b) has been in position A for a long time. At $t = 0$, it is changed to position B. Give the expression for the current into the top terminal of the inductor for $t > 0$. [8 marks]
- (c) Given a circuit consist of one resistor, R , one inductor, L and one capacitor, C connected in series. If $R = 70\Omega$ and $L = 2.5H$, determine the values of C if the RLC system is overdamped, critically damped and underdamped. [6 marks]

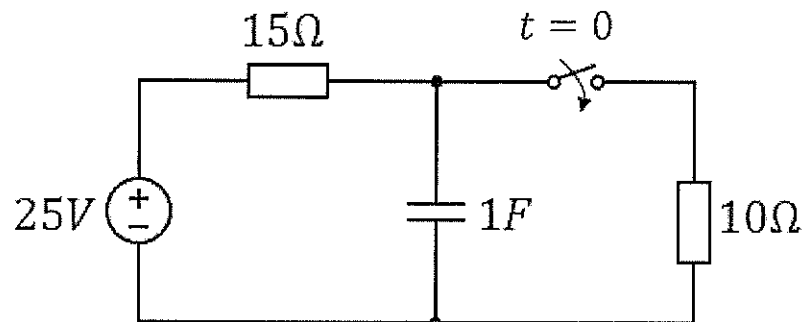


Figure Q4(a)

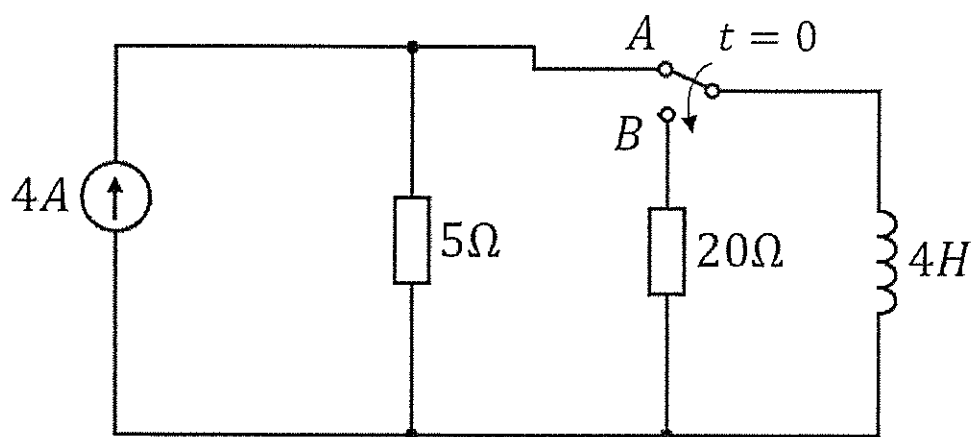


Figure Q4(b)

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